

**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings of claims in the application:

**Listing of Claims:**

- 1                   1 (currently amended): A method of detecting the presence of special nuclear materials in a container, comprising:
  - 3                   a) irradiating the container with an energetic beam which induces, so as to induce a fission in the special nuclear materials, resulting in fission products;
  - 5                   b) stopping the irradiating after a period of time;
  - 6                   c) after the stopping, detecting the gamma rays outside the container and recording energy data and temporal data that are emitted from the fission products formed by said fission, to produce a detector signal;
  - 9                   d) analyzing the energy data to determine an energy range for the gamma rays; and
  - 11                  e) analyzing the temporal data to determine an effective half-life; whereby it is determined that the container holds special nuclear materials when the energy range comprises values greater than an energy threshold level and the effective half-life is less than a half-life threshold value.
  - 15                  comparing the detector signal with a threshold value to form a comparison; and
  - 16                  detecting the presence of the special nuclear materials using the comparison.
- 1                   2 (original): The method of claim 1 wherein said irradiating comprises irradiating said container with a beam of neutrons.
- 1                   3 (original): The method of claim 1 wherein said irradiating comprises irradiating said container with a deuterium produced beam of neutrons.

1                   4 (withdrawn): The method of claim 1 wherein said irradiating comprises  
2 irradiating said container with a tritium produced beam of neutrons.

1                   5 (withdrawn): The method of claim 1 wherein said irradiating comprises  
2 irradiating said container with a gamma-ray beam capable of adding sufficient energy to the  
3 nucleus of the special nuclear material to overcome the fission barrier and thus induce a fission  
4 in the special nuclear material.

1                   6 (currently amended): The method of claim 1 wherein said irradiating  
2 comprises ~~irradiating said container in order to induce a thermal fission in the special nuclear~~  
3 ~~materials and to produce~~ producing short-lived and high-energy gamma rays that are emitted  
4 from the ~~resulting~~ fission products.

7 (canceled)

1                   8 (withdrawn): The method of claim 6 wherein said short-lived gamma rays  
2 comprise gamma rays that have a half-life that is smaller than approximately thirty seconds.

9 (canceled)

1                   10 (withdrawn): The method of claim 6 wherein said high-energy gamma rays  
2 are gamma-ray that have an energy that is higher than approximately 4MeV.

1                   11 (withdrawn): The method of claim 1 wherein said detecting is conducted  
2 using a germanium detector.

1                   12 (withdrawn): The method of claim 1 wherein said detecting is conducted  
2 using a liquid scintillation detector.

1                   13 (original): The method of claim 1 wherein said detecting is conducted using a  
2 plastic scintillation detector.

1                   14 (currently amended): The method of claim 1 wherein said detecting is  
2   conducted for approximately 30 seconds after a time period after the cessation of said irradiating.

1                   15 (withdrawn): The method of claim 1 wherein said detecting is conducted for a  
2   time period after the cessation of said irradiating.

16 (canceled)

1                   17 (currently amended): The method of claim 16 wherein said energy  
2   characteristics data comprises an energy spectrum of the gamma rays.

1                   18 (currently amended): The method of claim 17 wherein said energy spectrum  
2   comprises a measure of the number of detected gamma-rays as a function of the energies of the  
3   detected gamma rays.

1                   19 (withdrawn): The method of claim 16 wherein said energy characteristics  
2   comprises a measure of the time dependence of the yield of the gamma rays.

20-22 (canceled)

1                   23 (currently amended): The method of claim 22 1 wherein said energy  
2   threshold value level is approximately 3 MeV.

1                   24 (withdrawn): The method of claim 22 wherein said energy threshold value is  
2   approximately 4 MeV.

25 (canceled)

1                   26 (currently amended): The method of claim 25 1 wherein said half-life  
2   threshold value is approximately 20 seconds.

1                   27 (withdrawn): The method of claim 25 wherein said half-life threshold value is  
2   approximately between 20 and 30 seconds.

28 (canceled)

1                   29 (currently amended): A method of detecting the presence of special nuclear  
2 materials in a container, comprising the steps of:

3                   a) irradiating the container with an energetic beam ~~in order to which~~ induces a  
4 fission in the special nuclear materials, ~~resulting in and to produce short lived and high energy~~  
5 ~~gamma rays that are emitted from the resulting fission products;~~

6                   b) stopping the irradiating after a period of time;

7                   c) after the stopping, detecting the gamma rays outside the container and  
8 recording energy data and temporal data that are emitted from the fission products formed by  
9 said fission, to produce a detector signal;

10                   d) analyzing the energy data to determine an energy range for the gamma rays;  
11 and

12                   e) analyzing the temporal data to determine an effective half-life;  
13 whereby it is determined that the container holds special nuclear materials when  
14 the energy range comprises values greater than 3.0 MeV and the effective half-life is  
15 approximately 25 seconds.

16                   comparing the detector signal with a threshold value to form a comparison; and  
17                   detecting the presence of the special nuclear materials using the comparison,  
18 wherein said detecting is configured to detect said presence when the energy of the detected  
19 gamma rays is higher than an energy threshold value and when the half life of the detected  
20 gamma rays is less than a half life threshold value.

1                   30 (withdrawn): A system for detecting the presence of special nuclear materials  
2 in a container, comprising:

3                   an energetic beam source configured for irradiating the container, so as to induce  
4 a fission in the special nuclear materials;

5                   a detector configured for detecting the gamma rays that are emitted from the  
6 fission products formed by said fission, to produce a detector signal;

7                   a comparator for comparing the detector signal with a threshold value to form a  
8 comparison; and  
9                   a presence detector for detecting the presence of the special nuclear materials  
10 using the comparison.

1                   31 (withdrawn): The system of claim 30 wherein said energetic beam source  
2 comprises a beam of neutrons.

1                   32 (withdrawn): The system of claim 30 wherein said energetic beam source  
2 comprises a deuterium neutron source.

1                   33 (withdrawn): The system of claim 30 wherein said energetic beam source  
2 comprises a tritium neutron source.

1                   34 (withdrawn): The system of claim 30 wherein said energetic beam source  
2 comprises a gamma-ray beam capable of adding sufficient energy to the nucleus of the special  
3 nuclear material to overcome the fission barrier and thus induce a fission in the special nuclear  
4 material.

1                   35 (withdrawn): The system of claim 30 wherein said energetic beam source is  
2 configured for irradiating said container in order to induce a thermal fission in the special nuclear  
3 materials and to produce short-lived and high-energy gamma rays that are emitted from the  
4 resulting fission products.

1                   36 (withdrawn): The system of claim 35 wherein said short-lived gamma rays  
2 comprise gamma rays that have a half-life that is smaller than approximately 1 minute.

1                   37 (withdrawn): The system of claim 35 wherein said short-lived gamma rays  
2 comprise gamma rays that have a half-life that is smaller than approximately thirty seconds.

1                   38 (withdrawn): The system of claim 35 wherein said high-energy gamma rays  
2 are gamma-ray that have an energy that is higher than approximately 3MeV.

1                   39 (withdrawn): The system of claim 35 wherein said high-energy gamma rays  
2 are gamma-ray that have an energy that is higher than approximately 4MeV.

1                   40 (withdrawn): The system of claim 30 wherein said detector comprises a  
2 germanium detector.

1                   41 (withdrawn): The system of claim 30 wherein said detector comprises a liquid  
2 scintillator detector.

1                   42 (withdrawn): The system of claim 30 wherein said detector comprises a  
2 plastic scintillator detector.

1                   43 (withdrawn): The system of claim 30 wherein said detector is configured to  
2 detect the gamma rays after a time period after the cessation of said irradiating.

1                   44 (withdrawn): The system of claim 30 wherein said detector is configured to  
2 detect said gamma rays for a time period after the cessation of said irradiating

1                   45 (withdrawn): The system of claim 30 wherein said detector is configured for  
2 detecting the energy characteristics of the gamma rays.

1                   46 (withdrawn): The system of claim 45 wherein said energy characteristics  
2 comprises an energy spectrum of the gamma rays.

1                   47 (withdrawn): The system of claim 46 wherein said energy spectrum  
2 comprises a measure of the number of detected gamma-rays as a function the energies of the  
3 detected gamma rays.

1                   48 (withdrawn): The system of claim 45 wherein said energy characteristics  
2 comprises a measure of the time dependence of the yield of the gamma rays.

1                   49 (withdrawn): The system of claim 30 wherein said comparator is configured  
2 for comparing the energy level of the detected signal with an energy threshold value.

1                   50 (withdrawn): The system of claim 30 wherein said comparator is configured  
2 for comparing the time dependence of the detected gamma ray yields with a half-life threshold  
3 value.

1                   51 (withdrawn): The system of claim 30 wherein said presence detector is  
2 configured to detect said presence when the energy of the detected gamma rays is higher than an  
3 energy threshold value.

1                   52 (withdrawn): The system of claim 51 wherein said energy threshold value is  
2 approximately 3 MeV.

1                   53 (withdrawn): The system of claim 51 wherein said energy threshold value is  
2 approximately 4 MeV.

1                   54 (withdrawn): The system of claim 30 wherein said presence detector is  
2 configured to detect said presence when the half-life of the detected gamma rays is less than a  
3 half-life threshold value.

1                   55 (withdrawn): The system of claim 54 wherein said half-life threshold value is  
2 approximately 20 seconds.

1                   56 (withdrawn): The system of claim 54 wherein said half-life threshold value is  
2 approximately between 20 and 30 seconds.

1                   57 (withdrawn): The system of claim 30 wherein said presence detector is  
2 configured to detect said presence when the energy of the detected gamma rays is higher than an  
3 energy threshold value and when the half-life of the detected gamma rays is less than a half-life  
4 threshold value.

1                   58 (withdrawn): A system for detecting the presence of special nuclear materials  
2 in a container, comprising:

3                   an energetic beam source configured for irradiating the container in order to  
4 induce a fission in the special nuclear materials and to produce short-lived and high-energy  
5 gamma rays that are emitted from the resulting fission products;

6                   a detector configured for detecting the gamma rays that are emitted from the  
7 fission products formed by said fission, to produce a detector signal;

8                   a comparator for comparing the detector signal with a threshold value to form a  
9 comparison; and

10                  a presence detector for detecting the presence of the special nuclear materials  
11 using the comparison, wherein said presence detector is configured to detect said presence when  
12 the energy of the detected gamma rays is higher than an energy threshold value and when the  
13 half-life of the detected gamma rays is less than a half-life threshold value.

1                   59 (withdrawn): A system for detecting the presence of special nuclear materials  
2 in a container, comprising:

3                   means for irradiating the container with an energetic beam, so as to induce a  
4 fission in the special nuclear materials;

5                   means for detecting the gamma rays that are emitted from the fission products  
6 formed by said fission, to produce a detector signal;

7                   means for comparing the detector signal with a threshold value to form a  
8 comparison; and

9                   means for detecting the presence of the special nuclear materials using the  
10 comparison.

1                   60 (withdrawn): The system of claim 59 wherein said means for irradiating  
2 comprises an energetic beam source configured for irradiating said container in order to induce a  
3 fission in the special nuclear materials and to produce short-lived and high-energy gamma rays  
4 that are emitted from the resulting fission products.

1                   61 (new): The method of claim 1 wherein the period of time is approximately 30  
2 seconds.

1                   62 (new): A method of detecting special nuclear materials that are hidden in a  
2 container whose contents are not known, comprising:

3                   irradiating a container whose contents are not known, to produce fission in the  
4 special nuclear materials that are hidden in the container, to produce fission products and gamma  
5 rays that are emitted from the fission products, the gamma rays having an energy characteristic;

6                   detecting the gamma rays to produce a detector signal for detected gamma rays;

7                   comparing the detector signal with a threshold value to form a comparison; and

8                   detecting the special nuclear materials that are hidden in the container whose  
9 contents are not known, using the comparison.

1                   63 (new): The method of claim 62 wherein said energy characteristic comprises  
2 an energy level and said comparing the detector signal with a threshold value comprises  
3 comparing the energy level of the detected gamma rays with an energy threshold value.

1                   64 (new): The method of claim 63 wherein said energy threshold value is  
2 approximately 3 MeV.

1                   65 (new): The method of claim 62 wherein said energy characteristic comprises  
2 time dependent gamma ray yields, and wherein said comparing the detector signal with a  
3 threshold value comprises comparing the time dependent gamma ray yields with a half-life  
4 threshold value.

1                   66 (new): The method of claim 62 wherein said detecting the special nuclear  
2 materials using the comparison is configured to detect the special nuclear materials when a half-  
3 life of the detected gamma rays is less than a half-life threshold value.

1                   67 (new): The method of claim 66 wherein said half-life threshold value is  
2 approximately 25 seconds.

1                   68 (new): The method of claim 62 wherein said detecting the special nuclear  
2 materials using the comparison is configured to detect the special nuclear materials when an  
3 energy of the detected gamma rays is higher than an energy threshold value and when a half-life  
4 of the detected gamma rays is less than a half-life threshold value.

1                   69 (new): The method of claim 62 wherein said detecting is conducted using a  
2 plastic scintillation detector.